

GPM Microwave Imager Engineering Model Results

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The Global Precipitation Measurement (GPM) Microwave Imager (GMI) Instrument is being developed by Ball Aerospace and Technology Corporation (BATC) for the GPM program at NASA Goddard.

The Global Precipitation Measurement (GPM) mission is an international effort managed by the National Aeronautics and Space Administration (NASA) to improve climate, weather, and hydro-meteorological predictions through more accurate and more frequent precipitation measurements. The GPM Microwave Imager (GMI) will be used to make calibrated, radiometric measurements from space at multiple microwave frequencies and polarizations. GMI will be placed on the GPM Core Spacecraft together with the Dual-frequency Precipitation Radar (DPR). The DPR is two-frequency precipitation measurement radar, which will operate in the Ku-band and Ka-band of the microwave spectrum. The Core Spacecraft will make radiometric and radar measurements of clouds and precipitation and will be the central element of GPM's space segment. The data products from GPM will provide information concerning global precipitation on a frequent, near-global basis to meteorologists and scientists making weather forecasts and performing research on the global energy and water cycle, precipitation, hydrology, and related disciplines. In addition, radiometric measurements from GMI and radar measurements from the DPR will be used together to develop a retrieval transfer standard for the purpose of calibrating precipitation retrieval algorithms. This calibration standard will establish a reference against which other retrieval algorithms using only microwave radiometers (and without the benefit of the DPR) on other satellites in the GPM constellation will be compared.

The instrument has completed the Critical Design Review phase of the program. The design of the instrument is complete. During the CDR phase of the program a number of Engineering Models of the GMI subsystems were completed. These are described and the measured performance reported. An end-to-end RF subsystem engineering model including the power converter, data handling, and 37 GHz receiver was built and tested. Engineering models of the other individual receiver bands were also built and tested. This includes the high frequency receivers at 166 GHz. Engineering models of the main reflector and the reflector deployment assembly were also built and tested. The complete Instrument Control Electronics was built and tested along with the resolver and rotary transformer in the spin mechanism assembly. The slip ring assembly engineering unit was built and tested. Integrated testing of the ICA EMU and RF subsystem EMU was completed. In addition, these EMUs were tested with the EMU DPR radar in Japan to verify compatibility between the radar and the GMI radiometer.

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